REMARKS

The Amendments

The amendment does not narrow the broadest scope of the claims. It is believed to have been evident that the liquid for filling the pores in the final step of claim 1 must be a liquid electrolyte or else the result recited at the beginning of the claim, i.e., that "the pores of which are filled with a liquid electrolyte," would not be achieved.

It is submitted that the above amendments would put the application in condition for allowance or materially reduce or simplify the issues for appeal. The amendments do not raise new issues or present new matter and do not present additional claims. The amendments have been made for clarification purposes in view of the new 35 U.S.C. §112, second paragraph, rejection made in the Final Office Action. Because the need for the clarification was first recognized in the Final Office Action, the amendment was not earlier presented. Accordingly, it is submitted that the requested amendment should be entered.

To the extent that the amendments avoid the prior art or for other reasons related to patentability, competitors are warned that the amendments are not intended to and do not limit the scope of equivalents which may be asserted on subject matter outside the literal scope of any patented claims but not anticipated or rendered obvious by the prior art or otherwise unpatentable to applicants. Applicants reserve the right to file one or more continuing and/or divisional applications directed to any subject matter disclosed in the application which has been canceled by any of the above amendments.

The Rejection under 35 U.S.C. §112

The rejection of claims 1-11 and 17-25 under 35 U.S.C. §112, second paragraph, is

rendered moot by the above amendment to claim 1 and cancellation of claim 22.

The Rejection under 35 U.S.C. §103

The rejection of claims 1-11 and 17-25 under 35 U.S.C. § 103, as being obvious over Leonard (U.S. Patent No. 3,681,136) in view of Oehme (Liquid Electrolyte Sensors article) is respectfully traversed.

Leonard discloses a method for forming what they call a porous metal salt layer on a metal substrate surface.

As recognized in the Final Office Action (bottom of page 2), Leonard fails to disclose preparation of a porous solid which contains a liquid electrolyte in the pores. Leonard discloses nothing regarding filling the "pores" of its resulting materials with a liquid electrolyte. Further, it is not clear that the Leonard materials could be filled with a liquid, even if that was indicated by the reference to be desired. As shown in Figure 3 of the reference, the structure of the metal salt layer in Leonard is more of a structure of fibers of the remaining metal salt, which Leonard terms as "prills"; see, e.g., col. 3, lines 59-68. It is not evident that such prill structure would be capable of being filled with a liquid. Even if the structure is deemed similar, the claimed invention is still not suggested by the newly cited art.

The basis for the new grounds of rejection is that: a) Oehme teaches contacting an electrode material with a liquid electrolyte to establish an electrical connection, b) it would have been obvious from such teaching to contact the electrode of Leonard with a liquid electrolyte and c) exposing the electrode of Leonard to an electrolyte "would presumably fill the pores of Leonard."

Although Oehme does disclose embodiments involving contacting an electrode with a liquid electrolyte, it does not teach that all electrodes are used in connection with a liquid

electrolyte. First of all, the reference is a chapter from a book wherein the chapter is specifically devoted to "Liquid Electrolyte Sensors." Because Liquid Electrolyte Sensors are addressed in a separate chapter, it is presumed that other parts of the book relate to electrodes not used in connection with liquid electrolytes. Further, even this chapter recognizes that electrodes which rely on solid-state contact – and thus no liquid electrolyte – are known; see, e.g., page 244, under Section 7.1.2.2. Leonard discloses preparation of electrodes but it does not disclose that its electrodes are designed for use with liquid electrolytes. There is no suggestion from the reference that the Leonard electrodes are used with a liquid electrolyte, thus, there is no motivation to one of ordinary skill in the art to combine the teachings from Oehme relating to liquid electrolyte/electrode embodiments.

Second, even if it was obvious to use the Leonard electrode with a liquid electrolyte, there is no basis for presuming that the liquid electrolyte would fill the pores of Leonard's electrodes. The mere existence of some type of porosity does not guarantee that a liquid will fill such porous spaces. Whether porous spaces are filled on contact with a liquid depends on a number of factors, including, local surface tension of the materials involved, pore size, the extent to which the pores are open, kinetic effects and the ability to displace the air in the porous space.

The distinction in objectives and structure of the Leonard electrodes from those of the claimed invention further direct one of ordinary skill away from the claimed invention. Leonard is directed to a materials for making electrodes. For an electrode – when used in connection with a liquid electrolyte – to operate, it is merely necessary that the liquid electrolyte humidify the electrode to create the electrical contact. Applicants' invention provides porous solids having a high conductivity, for example, for use as a solid electrolyte; see, e.g., the paragraph bridging pages 5-6, and Example 3, page 7, of the instant

specification. To obtain the optimum conductivity, it is required that the liquid electrolyte completely fill the pores of the porous solid. See instant claim 11 in this respect also, which is further distinguished since Leonard fails to disclose or suggest a porous solid as an electrolyte.

In view of the discussion in the above two paragraphs, i.e., that a liquid will fill the pores of a solid only if certain conditions are met and that an electrode, as in Leonard, does not require filling of the porous space for operation, it is urged that it cannot be presumed that using the Leonard electrodes with a liquid electrolyte will result in filling of the "pores" of the Leonard material with the liquid electrolyte. Thus, the presumption that the pores of Leonard would be filled with a liquid electrolyte if contacted with such, without any direct teaching of this, is not supported on the record.

For all of the above reasons, at least, it is urged that the combined teachings of Leonard and Oehme fail to render the claimed invention obvious to one of ordinary skill in the art. Thus, the rejection under 35 U.S.C. § 103 based on these references should be withdrawn.

The Rejection under 35 U.S.C. §102/103

The rejection of claims 10, 11 and 18-23 under 35 U.S.C. § 102, as being anticipated by, or under 35 U.S.C. § 103, as being obvious over, Shen (U.S. Patent No. 5,650,054) is respectfully traversed.

Shen discloses electrochemical gas sensors having electrodes and a solid proton conductor membrane. The sensor contains a water reservoir to provide a water vapor saturated atmosphere for the sensor. It is clear that the electrodes and membrane are not immersed in the water reservoir; see e.g., Figures 2-4, and the description at col. 7, lines 3-16.

The nature of the solid proton conductive electrolyte membrane is discussed at col. 8, lines 21-55, for example. Claim 1 recites that this solid proton conductive electrolyte membrane is "permeable to water **vapor**" (emphasis added).

Shen does not disclose that the proton conductor membrane is porous, as alleged in the Office Action (page 4, paragraph 19).

It is first noted that the Office Action points to col. 8, lines 21-63, to support such teaching but the reference discusses the proton conductor membrane only at col. 8, lines 21-55, of this section. Lines 56-63 of col. 8 discuss a separate element, i.e., a microporous hydrophobic membrane. See Fig. 2 wherein the proton conductor member, element 12, is a completely separate element from the microporous hydrophobic membrane, element 204.

Shen does not disclose or suggest that its proton conductor membrane is porous, particularly porous to liquid such that it could be filled with a liquid electrolyte. To the contrary, one of the principal objectives of Shen is to avoid the use of porous materials filled with a liquid. See the Background discussion at col. 2, line 6, to col. 4, line 16, particularly noting the problems resulting from liquid electrolytes and the desire to provide a sensor with all solid conductor components. The Final Office Action acknowledges this clear teaching away in the reference, but counters that a material hydrated by water vapor is indistinguishable. As discussed in the following paragraph, the distinction between would be quite apparent to one of ordinary skill in the art. Accordingly, the Shen reference itself establishes that, even if the Shen electrolyte membrane could be filled with liquid water, there would be no motivation to fill it, since this would be directly contrary to the objectives of the Shen invention.

Regardless, Shen's disclosure that its solid electrolyte membrane is hydrated and is permeable to water vapor provides no teaching or suggestion that the solid electrolyte

membrane could even be filled with liquid water – if such was desired. Water vapor is not a liquid. A teaching that a material is permeable to water vapor provides no suggestion that it must also be permeable to liquid water. Shen itself makes this clear in its discussion of the "microporous hydrophobic membrane 204" at col. 8, lines 55-63, giving examples such as Gore-Tex®. This material is impermeable to liquid water – hence the "hydrophobic" designation by Shen – but is "microporous" to water vapor. Contrary to the arguments in the Office Action (top of page 6), the distinction between such materials is highly significant. Obviously, a material which is permeable only to water vapor and not to liquid water will not be capable of being filled with a liquid electrolyte. This is of utmost significance here since applicants' invention cannot function – and the claim recitations are not met – unless the pores are filled with a liquid electrolyte. The "end result" of a material filled merely with water vapor rather than the liquid electrolyte is not the same, as argued in the Office Action. Applicants' materials filled only with water vapor in the pores will not provide the conductivity sought by the invention. It is evident to one of ordinary skill in the art that water vapor has miniscule conductivity in comparison to a liquid electrolyte. For example, a turned on radio dropped into a tub of water has a shockingly different end result than a radio playing in a room with a steamy shower.

Regarding the "microporous hydrophobic membrane 204" of Shen – which, as discussed above, is a completely separate material from the electrolyte of Shen – this membrane is made of a polymer material, not an inorganic ionic material. Thus, this teaching of Shen additionally does not disclose or suggest any "porous solid" which is formed of a "first phase which includes one or more inorganic ionic components" or any sensor or other article which contains such a porous solid. Compare instant claim 1. Contrary to the statement in the Office Action (bottom of page 5), instant claim 1 clearly does specify that

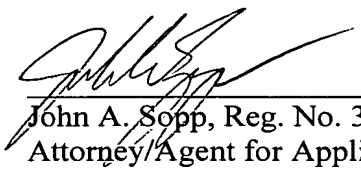
the porous solid produced by the invention be of "one or more inorganic ionic components." This is the "first phase" of the mixture which remains as the product after the second phase is removed. Thus, the "microporous hydrophobic membrane" of Shen also does not anticipate or render obvious the claimed invention for this additional reason.

For all of the above reasons, at least, it is urged that Shen fails to teach or suggest the claimed invention to one of ordinary skill in the art. Thus, the rejection under either 35 U.S.C. §102 or 35 U.S.C. §103 over Shen should be withdrawn.

It is submitted that the application is in condition for allowance. But the Examiner is kindly invited to contact the undersigned to discuss any unresolved matters.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,



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